



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 6  
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DALLAS TX 75202-2733

SEP 15 2014

Ms. Lessie Redican  
Manager, Technical Services Division  
Arkansas Department of Environmental Quality  
5301 Northshore Drive  
North Little Rock, Arkansas 72118-5317

Dear Ms. Redican:

In accordance with 40 CFR Part 58, Appendix A, Section 2.5, the U.S. Environmental Protection Agency (EPA) conducted a Technical System Audit (TSA) of the Arkansas Department of Environmental Quality (ADEQ) air monitoring program on November 20 and 27 through 29, 2012. Enclosed is a copy of the TSA report which includes observations and findings on the different aspects of the ADEQ air monitoring program. Please respond with your planned actions to address recommendations based on our findings by November 10, 2014.

We would like to recognize the work of you and your staff on the maintenance and operation of the ADEQ air monitoring network. Since our last TSA visit in 2009, the ADEQ has made improvements to the program, including siting of the carbon monoxide and sulfur dioxide trace level monitors, equipment maintenance, better record keeping procedures and separation of audit procedures.

As part of our TSA visit, the EPA and the ADEQ discussed the maintenance of equipment at the North Little Rock Airport (NLRAP) site (Air Quality System, AQS #05-119-1002). ADEQ provided EPA correspondence which included the Revocable License Agreement (RLA) 16-00148-82 for equipment at the NLRAP site. The RLA 16-00148-82 included the trailer, air conditioner unit and bag samplers. According to the documentation, on October 8, 1999, EPA provided notification that items loaned to ADEQ were in the process of being excessed so that ADEQ may keep the property. A review of the EPA Region 6 Air Monitoring Equipment Inventory verified that the equipment had been removed and was no longer in Region 6's inventory. At this time, the items documented in the RLA are the property of ADEQ. As such the responsibility for their maintenance resides with ADEQ for operation at the NLRAP site.

We appreciate the collaboration you and your staff offered to us while we conducted the TSA of the ADEQ air monitoring network. We look forward to our continued collaborative work with the ADEQ. If you have any questions concerning this TSA, please contact me at (214) 665-2230. If your staff requires additional information concerning this matter or to provide any clarifications, they may contact my staff, Kara Allen at (214) 665-7333.

Sincerely yours,

A handwritten signature in cursive script, reading "Maria L. Martinez", is written over a horizontal line.

Maria L. Martinez  
Chief  
Air Quality Analysis Section

Enclosures

Technical System Audit (TSA) Report  
Arkansas Department of Environmental Quality (ADEQ)  
Little Rock, Arkansas  
November 20 & 27-29, 2012

An evaluation of the ADEQ air monitoring program or TSA was conducted on November 20 and 27 through 29, 2012. The TSA included a conference call on November 20, 2012 to discuss submitted documentation and an on-site evaluation November 27 through 29, 2012. The previous TSA was conducted April 20 through 22, 2009. Since the last TSA, the ADEQ has made improvements to the program, including the siting of the CO and SO<sub>2</sub> trace level monitors, equipment maintenance, better record keeping procedures, annual auditing of meteorological equipment and separation of audit procedures. Please see the narrative below for additional details.

On November 20, 2012, EPA staff comprised of Jim Afghani, Bill Nally, John Lay, Robert Lushek and Kara Allen conducted a conference call with ADEQ to discuss the TSA Form including the particulate matter (PM) equipment, field support and visits to the monitoring sites and documentation to review during the on-site evaluation. After the TSA, ADEQ provided the finalized TSA questionnaire (see Appendix A).

The EPA TSA on-site evaluation team (the EPA audit team) comprised of Trisha Curran, John Lay, and Kara Allen conducted an entrance orientation with the ADEQ staff on November 27, 2012. During the evaluation process, EPA had the privilege of working with Dick Cassat, Miriam Talbert, Shaun Kitchen and Lisa Gullledge. An exit conference was held on November 29, 2012, at which time preliminary findings were discussed with ADEQ staff. The discussions with ADEQ staff focused on the following key elements: 1) general/quality management, 2) network management/field operations, 3) laboratory operations and 4) data and data management.

During the TSA, the EPA Audit Team and the ADEQ had the opportunity to discuss additional items for the air monitoring network. Among the areas discussed were: 1) the EPA trailer and the 1982 Revocable License Agreement 16-00-148-82 and 2) instrument issues. Please see the narrative below for additional details.

### **General/Quality Management**

At the time of the TSA, ADEQ was operating under the Quality Management Plan (QMP) dated March 2, 2012 and the Quality Assurance Project Plan (QAPP) for the Ambient Air Quality Monitoring Program was under technical review. EPA was able to provide direct support for the QAPP under technical review to discuss comments submitted and required information needed. The QAPP was approved on November 30, 2012. In the QAPP Appendices, ADEQ provided their formal Standard Operating Procedures (SOP) documenting the revision dates. The revision dates for the SOPs in the Appendices ranged from April 2001 to July 2012. The current revision date for the SOPs in the TSA Form was August 2012. During the TSA, ADEQ also provided their audit SOPs (see Appendix B) for review. ADEQ also maintained a binder containing the simplified versions of ADEQ SOPs. ADEQ informed EPA that lead (Pb) information was added to the PM information in Appendix J of the QAPP for the Ambient Air Quality Monitoring Program. ADEQ stated that Appendix J was updated (see Appendix C) and replaced Appendix M.

*ADEQ maintained extensive and detailed SOPs. EPA looked forward to the updated information and revision dates being incorporated into the QAPP in future QAPP revisions.*

ADEQ was responsible for the oversight of contractors and suppliers to accomplish ambient air monitoring within the State. Due to limited resources and ADEQ's coverage area, ADEQ employed co-operators for the operation and maintenance at PM<sub>2.5</sub> sites. In addition, existing personnel at ADEQ were becoming involved and trained by ADEQ technical staff for air monitoring responsibilities.

The ADEQ training for co-operators' duties included the maintenance and operation of the samplers. The co-operators changed filters, conducted verification and carried out some paper work including field data sheets and chain of custody forms. Co-operators were provided with SOPs, filters, supplies and ADEQ personnel phone numbers for access to needed information. The co-operators' training consisted of being walked through the process 1-4 times. In the event, something went wrong with the machine, the co-operators were limited on their capabilities and duties for what was handled. If it was a hard reset, the co-operators were talked through the process. ADEQ stated that the main problem with the co-operators was meeting the schedule for shipping the filters to ADEQ Headquarters. The schedule was to ship samples to ADEQ every other Tuesday. Another difficulty faced was that the co-operators' schedules were outside normal business hours for ADEQ personnel; therefore, meeting the co-operators was difficult.

*EPA appreciated ADEQ summarizing the training process and the availability of ADEQ staff to assist the co-operators. EPA recommended formal documentation of the training process for cooperators and include ADEQ's handling procedure for co-operators missing samples and samples not being shipped. EPA also recommended documentation of the training process for both new and existing ADEQ staff.*

#### **Network Management/Field Operations**

The siting documentation for the air monitoring sites was maintained at the ADEQ Office. The site files were maintained in hard copy format. A review of the files showed the siting documentation had been updated in 2012. ADEQ utilized existing personnel in an extended role as a yearlong project, in order to complete the documentation before the 2012 TSA. There were no photos of the Newport site (Air Quality System, AQS#05-067-0001), and the Deer site (AQS#05-101-0002) photos were dated 2009. ADEQ maintained the old site information and files for all of their sites including discontinued sites. The older site information provided valuable history for the parameters monitored and area conditions.

*The siting documentation was maintained in an easily accessible and concise format in large binders. The newer information did not include parameter information for the sites. EPA recommended updating the siting documentation for the Newport and Deer sites. EPA also recommended that future photos capture buildings, structures or vegetation around the site within close proximity and to identify the parameters start and stop dates for all sites.*

ADEQ informed EPA that they were in the early stages of developing electronic site information using a geographic information system (GIS). At the time of the TSA, the electronic site information was only pictures. The site GIS was able to turn on the aerial search and select the site. It contained an old photo of the site/shelter at the Crosset site (AQS#05-003-0005). The site map could be enabled with pictures that pop up. ADEQ informed EPA that there was a possibility to get it to the server for all of the sites for internal use.

*The preliminary development stage of GIS mapping for sites was an important step in having accessible and transparent site information especially for the public. EPA encouraged ADEQ's development of the electronic file and to include updated site photos, cardinal photos and parameter information. If all this information was incorporated, this electronic file system could be used as ADEQ's site files.*

On November 27, 2012, the EPA audit team visited the ADEQ air monitoring sites in the Little Rock area. A review was conducted of the equipment, operations/procedures, manuals, site documentation and a survey of the surrounding area. The sites visited were:

1. North Little Rock Airport (NLRAP) site (AQS #05-119-1002)
2. Pike Avenue at River Road (PARR) site (AQS #05-119-0007)
3. Doyle Springs Road (DSR) site (AQS #05-119-1008)

During the site visits, ADEQ provided site documentation and a demonstration of the paper procedures and protocols for the air monitoring site operation. ADEQ personnel not only had a dedicated vehicle for site visits and maintenance but also had access to a pool of vehicles if needed when their primary vehicle was in service. For gaseous monitoring, a set of manuals traveled with the designated vehicle. The gaseous pollutant operator kept a set of manuals in their truck. EPA conducted a review of the instrument logbooks at the sites. ADEQ incorporated the EPA recommendation from the 2009 TSA to separate logbooks to document instrument maintenance, calibrations and audits at the site. For the gaseous instrument logbooks, there were no initials from the gaseous pollutant operator/coordinator. ADEQ explained that if the logbook did not have initials, it meant that the personnel in charge of gaseous pollutants conducted the work. If someone else was able to conduct the audit, then the other person's audit work was documented with their initials. EPA also noted instances where entries in the logbook used pencil and erased occasional information from the 2010 to 2011 time period.

*EPA recommended documentation of all personnel performing work in the logbook including the gaseous coordinator and the time period that the gaseous coordinator was taking care of the instruments in the logbook. EPA also recommended not using pencils or erasing, i.e., documentation in indelible ink.*

ADEQ maintained spare window air conditioning units to replace the malfunctioning, broken or older units. Older refrigeration units were identified as older than 15 years. Some sites had wireless modems. ADEQ was able to access monitor information at the site through a smart phone. The switch box wireless modem would communicate with the data logger and ADEQ personnel obtained monitor information on a smartphone using the IP address. ADEQ explained that this was not possible for remote sites without a signal such as the Eagle Mountain site (AQS#05-113-0003) and the Deer site.

*EPA encouraged the update to a wireless modem to any remaining continuous sites capable of supporting the wireless network since this would increase data processing efficiency.*

The site manifolds were cleaned at least annually. Some sites collected more debris and were cleaned more frequently. The direct cause for the increased debris was unknown. The Deer site was located in a US Forest Service workstation and had a long manifold that required the aide of an additional person. The Eagle Mountain site also required two people to clean the manifold since it had a different setup and required a ladder to access the manifold. Personnel carried extra supplies with them when cleaning the manifolds especially if there was a break in the manifold that could not be sealed. If the break was not too severe and was able to get a good seal, the same manifold was used. During the cleaning of the manifolds, ADEQ personnel also verified that the pump still worked. The line was sealed, and the staff placed their hand over the inlet to test the pump's operation. Adjustments were then made if necessary. In addition, staff compared the ozone readings daily with other sites and if within the expected concentration range, it would support that the pump was pulling air. If there were concerns, it was usually a blower issue. ADEQ stated that when the blower was weak the measured ozone concentrations tended to be lower.

*EPA expressed concern for the flow check procedure of putting the hand over inlet during the cleaning of the manifold and using the comparison of ozone readings at other sites. These flow checks may not be adequate especially since they were performed annually. There were options to quantitatively monitor flow. EPA recommended adding a sensor or vacuum gauge or manifold and provided some possible options which included a vacuum gauge on the manifold or a minihelic II gauge with an electronic sensor that connected to the data logger.*

For PM Federal Reference Method (FRM) equipment, ADEQ picked up the samples every couple of days. The PM samplers were on a cycle that stored the clean ones on the left and moved the used filters for storage on the right. Since the 2009 TSA, ADEQ started cleaning the entire inlet including the head, tube, cylinder and cyclone. The cyclones were to be cleaned and changed out quarterly with the audit. ADEQ washed head inlets and tubes with soap and water and foam filters that cover inlets on the side for wires. ADEQ staff stated that the PM flow checks were every two weeks, and the flow audits were conducted quarterly. ADEQ confirmed that the very sharp cut cyclone was on all PM2.5 equipment.

*The EPA recommended cleaning the PM filter based inlets every 15 sampling events based on the recommendations in Appendix D of the QA Handbook Volume II for maintenance. For sites operating on a daily schedule this would increase the cleaning to twice a month. Appendix D of the QA Handbook Volume II recommended cleaning the sharp cut cyclone every 30 days, but the EPA encouraged cleaning the sharp cut cyclone at the same time as the inlet every 15 days. EPA advised that more routine cleaning provided better and increased accuracy. Any changes to the ADEQ process should be documented in the QAPP or SOPs.*

#### **NLRAP site (AQS #05-119-1002)**

The NLRAP site was located at the North Little Rock Fire Training Academy and National Weather Service (NWS) with a gated entrance. The site is north and west of the fire training site and east of a camper. There was a forest line to the north of the site. The area is surrounded by Camp Joseph Robinson National park. The parameter monitored at the NLRAP site was ozone (O<sub>3</sub>). The following Serial Numbers (SN) were identified at the site: SNA4418K (Data System Controller), SN70014364 (49C O<sub>3</sub> calibrator primary standard) and SN65138347 (49C O<sub>3</sub> analyzer).

NLRAP site used an EPA building older than 30 years that needed repairs (see Appendix D, Pics 1-2). The building was also used for storage and contained snouts for the PM2.5 monitors that were kept for surplus and spare parts along with 6 thermo snouts and 3 thermo heads for PM10. A new AC unit, a huge wall unit, was installed on May 3, 2000 at 9:00 am. NLRAP was equipped with a 4 inch glass manifold, and the through the probe (TTP) audit takes more time to stabilize compared to the 1 inch glass manifold. NLRAP equipment moved to PARR 10 to 12 years ago. ADEQ was able to check the meteorological data at the NWS office next to the site.

During the 2012 TSA, ADEQ provided the Revocable License Agreement (RLA) 16-00148-82 for equipment at the NLRAP site (see Appendix E). The RLA 16-00148-82 included the trailer, air conditioner unit and bag samplers. In order to update and maintain the site, ADEQ required the equipment to be under their ownership. ADEQ requested verification for the ownership of the equipment.

*According to the documentation provided by ADEQ, on October 8, 1999, EPA provided notification that items loaned to ADEQ via RLA 16-00148-82 were in the process of excessing so that ADEQ may keep the property. At this time, the equipment was no longer in the EPA Region 6 Inventory and was*

*considered abandoned. This property was considered the property of ADEQ and will need to be maintained by ADEQ to ensure proper working condition and operation at the NLRAP site.*

#### **PARR site (AQS #05-119-0007)**

The PARR site is north of vacant land/levee, east of residential, south of vacant land/industrial and west of Railroad tracks. There have not been any issues with the site since the fence was erected at the PARR site. There was a wooden platform that contained the PM, carbon and speciation samplers. The log books for the PM samplers were located in each cabinet and remained with the instrument. The PM samples were also with the instrument in the cabinet (see Appendix D, Pics 5-7). The sample bag had the site, run date/time and filter number on the clear bag holder.

#### **Platform Side A:**

PM2.5 (operates daily) and PM10/Pb (PM10 operates 1 in 3 and Pb operates 1 in 6) samplers were on the north side (Side A). The PM2.5 sampler contained the daily samples for 11/26/13 through 12/3/12 inside the cabinet. The cyclone for the PM2.5 inlet was also located inside. For the PM10/Pb samplers, the pumps kicked on and kept running at certain temperatures. The sampler contained three samples 11/26-11/27, 11/29-11/30 and 12/2-12/3.

#### **Platform Side B:**

The collocated PM2.5 (operates 1 in 6), collocated PM10/Pb (operates 1 in 6), carbon and speciation samplers were contained along the south side of the platform. The PM2.5 and PM10/Pb samplers each had one sample dated 11/29-11/30/12.

#### **Shelter A:**

For the NO-NO2-NOy analyzer, the cinometer was located inside the shelter; this was a variation. The shelter had a temperature gauge on the wall as a reference, but it was not an official temperature gauge. A certified barometer traveled with the gaseous operator. ADEQ stated that the ozone volume air got dirtier quicker. In addition, ADEQ stated that the SO2 quality assurance checks took a long time. ADEQ had at least 5 years of data for the site audit, calibration and correction information for SO2.

#### **Shelter B:**

The Thermo Zero Air Supply was for trace sulfur dioxide (SO2) and carbon monoxide (CO). ADEQ compared the trace and regular instruments for applicable pollutants. The laptop for the data logger was kept secure. According to the logbook, the Tapered Element Oscillating Microbalances (TEOM) RP series 1400A was installed on September 8, 2011 at PARR with documentation of the operator initials in the logbook. For the TEOM, the PM load and TEOM pressure drop increased fast. Around 85-90% ADEQ changed it because it jumped up so fast. During the site visit, the PM load pressure drop was at 62%. ADEQ was able to chart the information using the wireless connection via phone.

PARR had the only met tower at 10 meters. No other sites had a met tower at 10 meters, and the information at those sites was strictly for Air Quality Index (AQI) forecasts. In order to audit the met tower at the PARR site, personnel take out the back bolt and tip it out the front gate. ADEQ calibrated the instrument annually in response to the 2009 TSA.

The converter box for the NOy was located outside (see Appendix D, Pics 3-4). For the NOy inlet on the met tower, it had to be heated 325°C. The site had output boards to set the temperature and read the current temperature. The NOy and NOx at Marion was heated to 325°C as a precaution to prevent water from entering the inlet. NOy issues were more on the high end drift compared to NOx. NOy tended to

have more drift which ADEQ informed us that they were more vigilant about watching. ADEQ also stated that the NOy took longer for calibration points.

ADEQ maintained cylinders at the PARR site for the pollutants that were only monitored at this site; otherwise ADEQ used a transfer standard. PARR was the only site that used trace gas cylinders. ADEQ kept all of the cylinders including expired ones. EPA checked the expiration dates of the cylinders in use at the site and verified that they were not expired.

*While checking the cylinder expiration dates at the PARR site, EPA noted that it was not easy to see the label and expiration dates. It was also difficult to determine whether a cylinder was being used since cylinders that were not being used still had the tube attached. For all cylinders used anywhere in the Network or Lab, please clearly label or document whether cylinders were being used and the expiration date. EPA provided possible options to ADEQ to add to the SOP or add a note to the cylinders within the clear pouches attached to them.*

The parameters monitored at the site were O<sub>3</sub>, CO, SO<sub>2</sub>, NO-NO<sub>2</sub> NO<sub>x</sub>, NOy and PM with one PM<sub>2.5</sub> continuous (Tapered Element Oscillating Microbalances, TEOM), two PM<sub>2.5</sub> manual (Partisol Plus Model 2025, Partisol) and two PM<sub>10</sub>/Pb manual (Partisol). The following SNs were identified at the site: SN2025B227091010 (PM<sub>2.5</sub> Partisol), SN2025A209469812 (PM<sub>10</sub>/Pb R&P Partisol), SN2025B225800909 (PM<sub>10</sub>/Pb Thermo Partisol), SN2025B225840910 (PM<sub>2.5</sub> Thermo Partisol), SN0606615586 (Thermo 48C Co analyzer), SN60109325 (43C SO<sub>2</sub> Analyzer), SN0509111205 (42C NO-NO<sub>2</sub>-NOy analyzer), SN050911207 (146C Dynamic Gas Calibrator), SN0736126354 (Thermo Model 42i NOy) SN1032345593 (Thermo Zero Air Supply), SN0926137680 (Thermo Trace Model 146i Dynamic Gas Calibrator), SN65147347 (49C O<sub>3</sub> Calibrator), SN0926137679 (Model 48i TLE CO trace level), SN0926137678 (Thermo Model 43i TLE SO<sub>2</sub>), SN22118370 (49C O<sub>3</sub> analyzer). Meteorology was also monitored onsite.

#### **DSR site (AQS #05-119-1008)**

The DSR site was located on the City of Little Rock property and south of the City's building which contained equipment including lawn mowers. The site was east of a water storage tower and north and west of residential. There was a low shrub line south of the site. The DSR site had a new trailer; ADEQ stated that the old one had holes in the roof. The trailer had a heater inside and was wired to the thermostat to turn on and off; the AC was operational. The tires for the trailer were located inside the trailer to store and maintain better. The trailer had polyurethane floors. There was meteorology equipment at the DSR and Springdale sites (AQS#05-143-0005) for AQI for North Little Rock and Springdale/Fayetteville areas. The meteorology equipment was at approximately 20 feet. ADEQ used a solar radiation sensor for AQI. There was wireless service at the DSR site.

The PM<sub>2.5</sub> FRM monitor operated on a 1 in 3 day schedule and contained samples 11/26-27, 11/29-30 and 12/2-3. The PM<sub>2.5</sub> TEOM monitor was located in a separate cabinet outside the trailer. ADEQ logged the PM load and flow across the filter to track operation. ADEQ stated that if it dropped either the pump was bad or the intake for the filter was clogged. During the visit the PM load was within 2.98-3.02. The ozone analyzer was located in the trailer. It was equipped with impingers with silica to dry out moisture from the air both before the inlet air reaches the pump and again after the pump. A change in a pump or equipment malfunction is recorded in the calibrator logbook. If there is a big difference between the ozone analyzer and transfer standard, ADEQ indicated that it was an issue with calibration and flow. There would be an adjustment and logged in the book. The calibration for ozone turned on at midnight and runs for 30 minutes a night.

The parameters monitored at the site were O<sub>3</sub> and PM with one PM<sub>2.5</sub> continuous (TEOM) and one PM<sub>2.5</sub> manual (Partisol Plus 2025). The following SNs were identified at the site: SN2025A211719908 (PM<sub>2.5</sub> Partisol), SN04033432-4 (TEOM) and SN 72117-370 (49C O<sub>3</sub> analyzer). Meteorology was also monitored onsite.

*Region 6 appreciated the ingenuity ADEQ had used to protect the equipment at the site. ADEQ had shields on the PM10 and PM2.5 cabinets as a precaution to keep water from running into them. All of the analyzers and cabinets had the methods identified on them. Another example of the ingenuity used to protect the equipment was the metal cover over the glass manifold inlet at the DSR site (see Appendix D, Pics 8-9).*

### **Laboratory Operations**

On November 28, 2012, ADEQ provided a tour of the ADEQ Air Lab. The Air lab consisted of the following rooms: 2L07 Air Lab Monitoring containing supplies and PM cold storage, equipment and mailing, 2L08 Air Lab, 2L08a Air Filter Weighing Room, 2L09 Air Monitoring and 2L10 Air Monitoring Instruments (see Appendix D, Pics 10-15). In Room 2L10, ADEQ had backup equipment for the ozone analyzers and data loggers. ADEQ explained that they ordered equipment and trailers for 3 new potential sites at Hot Springs, Pines Bluff and Jones Burr. ADEQ also maintained equipment to dry out the material used in the impingers (see Appendix D, Pic 16). The color pink/purple indicated moisture. ADEQ provided an electronic site inventory list for the gaseous analyzers (see Appendix F). The PM equipment inventory was maintained on a white board in the lab (see Appendix D, Pic 17).

In the lab, ADEQ had extra PM heads and fourteen i series stored. There were two 2025i and two 2000i to send to the PARR and Adams Field (AQS #05-119-1004) sites. The maintenance of PM equipment was conducted by all staff. ADEQ detailed the different aspects of the new i series equipment. The equipment contained small tube that could hold 10 cassettes. The new Thermo equipment had a new keypad with no information or numbers and ADEQ could not get %CV over the 24 hour run. The keypad to enter numbers module does not lock in shifts and the boards would get loose. The filter exchange sticks due to cassettes in the exchange. Another benefit of the old samplers was that it had a stop mode in sequential with annual charge back up battery.

*EPA commended ADEQ on the backups, supplies and equipment to keep the network up and running.*

The ADEQ PM Coordinator detailed the process for handling the filters for PM and Pb. The PM<sub>2.5</sub> and PM10 filters were handled the same way. ADEQ received filters and inspected on initial opening of the box of filters. Once the filters were received, they were placed in a separate room (Room 2L08a) for 3 days before being weighed. Room 2L08a contained two dehumidifiers due to the large air conditioning unit and a computer to log information in the spreadsheet (see Appendix D, Pic 14). In Room 2L08a, ADEQ had control handling and checked the humidity and temperature quarterly, and the room was locked by the PM Coordinator. The filters were placed into a vacuum oven for 24 hours and then in Room 2L08a to equilibrate for 24 hours. The filters were put in blue rings and cans and weighed by date in a grouping of 5 runs to the lab work room. Five PM<sub>2.5</sub> filters for each site were put in a box with three cold blocks to be placed in the freezer. PM<sub>2.5</sub> filters were shipped to the sites without cold but were sent back with cold. Co-operators were mailed the PM<sub>2.5</sub> filters with unfrozen blocks and mailed back after retrieving sample with the blocks frozen. When the co-operators collected filters, they filled out the chain of custody form and bagged the paperwork for shipment with the frozen blocks. All staff picked up the PM<sub>2.5</sub> and PM10 filters twice a week for the sequential monitors. For the filter transfer to the refrigerator, ADEQ had stickers already printed for date, site and filter number which were added to the clear container. The corresponding metal tin was paired with the corresponding information sheet.



The PM2.5 filters remained in cold storage for 1 year. ADEQ stated they were running out of room for the filters so the filters may go back to the site for continued storage. ADEQ informed EPA that the new filters with numbers on them were not as stable and the measured weight jumped around. ADEQ also pulled filters on a quarterly basis to track the stability and noted an increase in weight.

ADEQ used nitrile gloves to handle the PM10 filters for Pb analysis. There was no refrigeration or special shipping procedures for the Pb samples being shipped to RTI. The filters were hand delivered to the site. ADEQ used EPA's contractor RTI for Pb PM10 analysis. During the TSA, ADEQ stated that they would not be able to conduct the analysis due to the acid used in the process. EPA requested the Pb data results to review. ADEQ explained the process for tracking the Pb filters and calculations using the filter spreadsheet. The chain of custody forms and PM2.5 spreadsheets used by ADEQ (see Appendix G) were provided.

*EPA recommended that ADEQ participate in the quarterly Pb PEP audit.*

Audits with transfer standards were performed every 3 months, calibrations were performed every quarter and precision checks were performed every 2 weeks. If adjustments to the slope needed to be made, ADEQ compared the primary standard with a transfer standard. The adjustments were documented by the calibrator or auditor. For O3, ADEQ calibrated the primary standard at each site. Transfer standards were compared to EPA's primary and then to the site primary.

ADEQ used different transfer standards and separate equipment to perform audits. There was separate audit and verification equipment. ADEQ displayed the audit kit that was taken to a site for calibration and the semi-annual and field quarterly verification kits. The verification kit and the audit kit were identical, but the one used for audits was not used for verifications. The kits were certified annually. Annual audits were conducted in the lab except for the sequentials at the PARR site; this is the only time that audits were conducted out of the lab. ADEQ confirmed the annual audit of multi point verification/calibrations. The main set of SOPs were located in the lab, but electronic copies were also available for the staff.

*EPA acknowledged the amount and level of work being performed especially with limited staff. In response to the 2009 TSA for audits, ADEQ had adapted the current procedure to use separate equipment, but ADEQ still needed to have two degrees of separation for data generating and gathering versus quality assurance.*

The ADEQ used vendor-supplied NIST traceable gases for QA audits and instrument calibrations. ADEQ had a new gas cylinder contractor, Air Gas. ADEQ informed EPA that it took a couple of months to reorder the gas cylinders. ADEQ received the gas certification forms which were attached to cylinders. ADEQ stated that the use of a smaller cylinder for example 15 ppm SO2 provided no cost savings. Cylinders in the lab were for gas flow measurements not standards. ADEQ provided the gas certification forms for cylinders (see Appendix H). EPA asked for standards to review including for the balance and humidifier and whether the thermometer was NIST certified.

*EPA requested follow-up with the gas certifications for the CO 170 ppm certified gas and length of time for cylinders certification. Please clarify or provide the traceability of the thermometer.*

## **Data and Data Management**

The Air Lab Chemist Supervisor and PM Coordinator provided a thorough review of the data process including reviews, validation and submittal. Two personnel handled the filters and wrote the results. Filter sheets in the tray were stapled together by run date with coversheet with all the sites. There was a white sheet which contained the site and initial lab weight. The information from the white sheet was input into an electronic spreadsheet. The sheets to the lab were color coded and change per quarter to easily identify (the colors included yellow, orange and blue). During the TSA, the sheets were red. The sheet contained the filter post sample weight. Sheets then went for review before data was uploaded into AQS. ADEQ used a spreadsheet macro to convert information files ready for entry to AQS. ADEQ could run reports for hourly minimum, maximum and average. ADEQ provided a visual display/run for the storage of historical data in 2011. The historical data contained daily and monthly information. The log for mailing out the PM filters and blanks were also color coded.

*ADEQ's process for the chain of custody forms and baggies that remained with the filters from receipt, storage, field and analysis allowed for continuous information and tracking to the lab with color coded forms. EPA found that this process added security and efficiency to the transfer of the filters.*

ADEQ described the process for compiling the information regarding the data in the Air Quality Monitoring Program Logbook (Missing Logbook). Every quarter the PM coordinator reviewed logbooks and did the missing data logbook for all data. Paper and carbon copies of logs of standards and audits in the lab were transferred to the logbook. EPA reviewed the gaseous coordinator/operator logbooks and noted the PM operator initials in the book. The Missing logbook also documented special events (i.e. fire, construction). ADEQ conducted a quarterly review of data before loading into AQS. ADEQ used a compilation of the personnel's books to compile information for non-continuous by PM2.5, PM10 and TEOM and continuous data by site and parameter. ADEQ also logged significant events, for example the El Dorado Chemical Fire in the Missing Logbook. Once the entries were written in the logbook, personnel then signed off on pages in the Missing Logbook. This process and information is documented in Appendix L of the ADEQ QAPP.

*The Missing Logbook clearly documented the signatures for crosschecking the information. EPA appreciated the formal documentation of the process in Appendix L of the ADEQ QAPP.*

ADEQ was able to use the computer to test run AQS data entry. ADEQ's AQS.SOP was updated to include the new information. The SOP binder with Air Vision software provided information to go through the node and went through the check. For AQS, ADEQ had programs that looked at the date for the maximum/minimum, outliers, and missing or anomalous data. They also had PM checks for data entered incorrectly. The data was converted into AQS format in-house to flat file. ADEQ reviewed and addressed any data issues. The information was retained until the data certification process was completed. ADEQ explained that the program was written so it would not put in a zero so ADEQ had to add zeroes to the data if needed. ADEQ logged the data and times when data was entered into AQS. ADEQ used the logbook to record some corrections. Revisions to ADEQ logbooks were stapled to the pages, and the rest of the logbook continued to be used.

*EPA appreciated ADEQ updating the AQS SOP and Data Management SOP with new procedures. For the AQS logbook, it was easy to follow the entries. EPA will need to see the entries or ADEQ will need to keep the sheets documenting changes. EPA stated that the editing of zeroes or missing data was still part of the data validation process. EPA recommended that the ADEQ documentation include the entry for zeroes that were eliminated, either in the documentation and/or a logbook entry.*